

REMARKS/ARGUMENTS

The Applicants have carefully considered this application in connection with the Examiner's Final Action mailed June 17, 2004, and respectfully request consideration of this application during continued examination in view of the foregoing amendments and the following remarks.

The Applicants originally submitted Claims 1-15 in the application. Previously, the Applicants amended Claims 1, and 11-15. In this response, the Applicants have amended Claims 1-8, 11, 14 and 15 without new matter to provide greater emphasis on the inventive aspects of the application. Accordingly, Claims 1-15 are currently pending in the application.

The Applicants previously submitted a response to the Examiner's June 17, 2004 Final Office action, pursuant to 37 C.F.R. §1.116, which was not entered. The Applicants request that the Examiner disregard that submission and instead consider the amendments and arguments herein.

I. Rejection of Claims 1-15 for Obviousness-Type Double Patenting

The Examiner has rejected Claims 1-15 under the judicially created doctrine of obviousness-type double patenting over claims 1-18 of U.S. Patent No. 6,289,151 to Kazarinov, *et al.* in view of Harvey, *et al.*, Optics Letters, Vol. 18, No. 2, Jan. 15, 1993, pp. 107-109. The Applicants respectfully traverse the rejection for the reasons set forth below.

Kazarinov generally teaches an all-pass optical filter design employing at least one feedback path, and teaches the generic elements of such a filter, including an input port, output port and a splitter/combiner. Kazarinov also teaches that each feedback loop requires at least one heater. Each heater requires power and control elements that increase the complexity of the filter. However, Claim 1 of the present application claims an article *comprising* an all-pass optical filter, but with the

limitations that 1) the filter is configured using a *single* feedback path, and 2) the input pulse train has a “regular repetition rate,” as discussed more fully below, and 3) the free spectral range of the filter is matched to the regular repetition rate of the input optical pulse.

The application uniquely recognizes the utility of an all-pass optical filter, employing a single feedback path, when the free spectral range (FSR) of the filter is matched to the regular repetition rate of the input pulse train. The Specification (p. 6, lns. 10-12) defines “regular repetition rate” as meaning “each of the frequencies of the pulse train differ from another (*i.e.*, adjacent) frequency by the same amount....” Restated, the optical signal is a constant pulse-rate signal. Referring to FIGURE 2 of the Application, the Fourier Transform of such a signal is shown, in which the signal energy peaks are equally spaced in the frequency domain by R , the pulse rate of the signal. When this condition is met, the general all-pass optical filter design of Kazarinov can be simplified to use a single feedback path, resulting in reduced complexity and cost. Such a filter can be used advantageously to synchronize control signals in an OTDM system. Specification at 10. Moreover, by offsetting the FSR of the filter from the repetition rate of an input pulse train, the filter can be used to correct for linear chirp on a pulse train. Specification at 9.

In his response, the Examiner has construed the embodiment described in Example 3 of Kazarinov as teaching the matching of the FSR of the filter to the regular repetition rate of an input optical pulse (pg. 6, para. 7). This is not what Kazarinov teaches. Kazarinov teaches, “The FSR is chosen to be an integer multiple of the system channel spacing.” System channel spacing is a design element of an OTDM communication system transmitting information. The pulse train of such a system transmitting information does not have a “regular repetition rate.” Thus, Kazarinov contains no teaching or suggestion that the FSR be matched to a regular repetition rate of an input pulse train,

and this element is not obvious from the cited example of Kazarinov. As such, the Kazarinov does not meet the test of obviousness required for a rejection of the claims under the judicially created doctrine of double patenting.

The Examiner also cites Harvey in his double-patenting rejection of the claims. Specifically, he asserts that Harvey teaches creating a plurality of time-delay periods that are synchronized with the repetition rate of an input pulse train. For reasons fully set forth below, the Examiner has misconstrued the teaching of Harvey. Harvey teaches synchronization of a plurality of *transmission intensity peaks* with the repetition rate of an input pulse train. Thus Harvey cannot be properly used to support an obviousness-type double patenting rejection.

Accordingly, the presently amended claims are in condition for allowance. The Applicants respectfully request that the Examiner remove the rejection of Claims 1-15 for obviousness-type double patenting.

II. Rejection of Claims 1-10 and 14 under 35 U.S.C. §103(a)

The Examiner has rejected Claims 1-10 and 14 as being unpatentable over Harvey. Harvey teaches a mode-locked ring laser comprising a Fabry-Perot interferometer, also known as a high-finesse étalon. Specifically, the Examiner asserts that the Fabry-Perot étalon taught by Harvey is an all-pass filter. With all due respect, the Examiner has misconstrued the function of a Fabry-Perot étalon.

Those skilled in the pertinent art know that an all-pass optical filter is a filter for which the magnitude of the amplitude of an optical signal is substantially unchanged, *i.e.*, $|H(\omega)| \approx 1$, while the phase can be arbitrarily changed. Specification, at 2. Those skilled in the pertinent

art also know that a Fabry-Perot étalon, in contrast, has a transmission function that has peaks of *maximum transmission* that are periodic in frequency. *See, e.g.,* Precision Photonics Corp., Basic Physics and Design of Etalons, Feb. 2, 2003, at <http://www.precisionphotonics.com/Technology/datafile.asp?FileID=33>. Therefore, by definition, Fabry-Perot étalons are not all-pass filters. The Examiner may be misled by the terminology, “Free Spectral Range,” used to describe both the range between phase delay peaks of the all-pass filter and the transmission intensity peaks of the Fabry-Perot étalon. This is, however, where the commonality ends; Fabry-Perot étalons are not all-pass filters. Therefore, Harvey does not teach an all-pass filter and thus not the all-pass filter of Claims 1 and 14.

Harvey also fails to suggest each and every element of independent Claims 1 and 14. In particular, Harvey does not suggest the use of an all-pass filter. Harvey is directed towards extending the error free distance of soliton transmission. This is accomplished by the disclosed mode-locked ring laser, designed to produce a repetition rate of 2.5 GHz with stabilized pulse amplitude. Such stabilization is realized by using an FSR of the Fabry-Perot étalon that is incrementally less than the ring-mode frequencies of the laser. This results in a highly sensitive error signal that is fed back to the modulator to stabilize the pulse rate.

However, the article claimed in the present Application finds utility in reducing the complexity of a communications system employing an optical time-division multiplexor. Among other applications is the previously discussed synchronization of control signals with multiplexed data signals. A person of ordinary skill in the art would not be motivated to look to Harvey to reduce

the complexity of an OTDM system, and if such a person did, would find no suggestion in Harvey of an all-pass filter.

Further, the use of an all-pass filter in Harvey would destroy the functionality of the disclosed ring laser. Those skilled in the pertinent art well know that étalons stabilize the output of a laser by filtering out undesired lasing mode. Such filtering requires a non-constant intensity transmission function. As described previously, an all-pass filter has a substantially constant intensity transmission function, so it cannot be used to filter undesired lasing modes. Moreover, Harvey's feedback stabilization technique relies on the periodic transmission peaks of the étalon, so Harvey's technique would not be possible using an all-pass filter.

Nor does Harvey contain any suggestion to use a single feedback loop in an all-pass optical filter, as recited in Claims 1 and 14. As discussed above, Harvey does not employ an all-pass optical filter, the use of such a filter in the ring laser design is not suggested, and would destroy the functionality of the laser and feedback system. Clearly, without suggestion of the all-pass optical filter, there can be no suggestion of a single feedback loop in such a filter.

Accordingly, the Examiner's arguments do not support a *prima facie* case of obviousness of independent Claims 1 and 14 over Harvey, and the claims are allowable. Claims 2-10, which depend directly or indirectly from Claim 1, are then also allowable. The Applicants respectfully request that the Examiner remove the rejection of Claims 1-10 and 14 under 35 U.S.C. §103(a).

III. Rejection of Claims 11-13 under 35 U.S.C. §102(b)

The Examiner has rejected Claims 11-13 under 35 U.S.C. §102(b) as being anticipated by Harvey. Independent Claim 11 includes the element of an all-pass optical filter. As discussed above,

the Examiner has attempted to draw an equivalence between a Fabry-Perot interferometer and an all-pass optical filter. This is clearly not the case, and the Applicants respectfully request that the Examiner remove the rejection of Claim 11 and Claims 12-13, which depend from Claim 11.

IV. Conclusion

In view of the foregoing amendments and remarks, the Applicants now view all of the Claims currently pending in this application to be in condition for allowance and therefore earnestly solicit a Notice of Allowance for Claims 1-15.

The Applicants request the Examiner to telephone the undersigned attorney of record at (972) 480-8800 if such would further or expedite the prosecution of the present application.

Respectfully submitted,

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Dated: November 17, 2004

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